

**Sources of renewable energy**

1256. SHRI MATILAL SARKAR: Will the Minister of NEW AND RENEWABLE ENERGY be pleased to state:

(a) the names of the sources from which renewable energy is generated;

(b) the total quantity of energy (power) that can now be generated in the maximum in each State and Union Territory of the country;

(c) the position of the potential of the sources of renewable energy for further exploration estimated as on date; and

(d) the percentage of coverage by the renewable sources of energy?

THE MINISTER OF STATE OF THE MINISTRY OF NEW AND RENEWABLE ENERGY (SHRI VILAS MUTTEMWAR): (a) The principal renewable sources from which energy is being generated are wind, small hydro, biomass and solar.

(b) Renewable energy potential of around 84,777 MWe from different renewable energy sources,, mainly wind, small hydro and biomass has been estimated in the country, detailed State-wise break-up of which is given in Statement (See below).

(c) and (d) Grid-interactive power generation capacity of 8993 MW (wind power-6070 MW, small hydro power 1850 MW, bio power 1073 MW) has been set up as on 30.9.2006, as per the State-wise break-up given in Annexure. This corresponds to around 7 per cent of the total installed power generation capacity, with a share of around 2.5 per cent in the electricity mix, against the estimated potential given in annexure, not all of which as explained in the footnotes might be either technically feasible or economically viable for grid-interactive renewable power.

**Statement**

*State-wise details of estimated potential of renewable energy and achievement of grid-interactive renewable power installed capacity as on 30.9.2006*

| Sl<br>No | STATES/UTS       | Wind Power |             | Small Hydro |             | Biomass Power |             | Bio Power |             | Waste to Energy |             | TOTAL     |             |
|----------|------------------|------------|-------------|-------------|-------------|---------------|-------------|-----------|-------------|-----------------|-------------|-----------|-------------|
|          |                  | Potential  | Achievement | Potential   | Achievement | Potential     | Achievement | Potential | Achievement | Potential       | Achievement | Potential | Achievement |
|          |                  | (in MW)    | (in MW)     | (in MW)     | (in MW)     | (in MW)       | (in MW)     | (in MW)   | (in MW)     | (in MW)         | (in MW)     | (in MW)   | (in MW)     |
| 1        | 2                | 3          | 4           | 5           | 6           | 7             | 8           | 9         | 10          | 11              | 12          | 13        | 14          |
| 1        | Andhra Pradesh   | 827500     | 121.60      | 254.63      | 178.81      | 616.70        | 20020       | 300.00    | 8605        | 12300           | 22.50       | 9569.33   | 609.16      |
| 2        | Arunachal        |            |             | 1059.03     | 44.30       | 535           |             |           |             |                 |             | 1064.38   | 44.30       |
| 3        | Assam            |            |             | 14890       | 2.11        | 13581         |             |           |             | 800             |             | 292.71    | 211         |
| 4        | Bihar            |            |             | 194.02      | 50.40       | 673.55        |             | 300.00    |             | 62.00           |             | 1229.57   | 50.40       |
| 5        | Chhattisgarh     |            |             | 179.97      | 11.00       | 121.69        | 5500        |           |             | 20.00           |             | 321.66    | 66.00       |
| 6        | Goa              |            |             | 2.60        | 0.05        |               |             |           |             |                 |             | 260       | 0.05        |
| 7        | Gujarat          | 967500     | 391.40      | 156.83      | 700         | 883.54        | 050         | 350.00    |             | 112.00          |             | 11177.3   | 398.90      |
| 8        | Haryana          |            |             | 3005        | 6270        | 1171.18       | 4.00        | 350.00    | 2.00        | 23.00           |             | 1574.23   | 6870        |
| 9        | Himachal Pradesh |            |             | 1624.78     | 132.08      |               |             |           |             | 1.00            |             | 1625.78   | 132.08      |
| 10       | Jammu &          |            |             | 1207.40     | 111.49      |               |             |           |             | 10.00           |             | 1217.40   | 111.49      |
| 11       | Jharkhand        |            |             | 17005       | 4.05        | 31.35         |             |           |             |                 |             | 2010.40   | 4.05        |
| 12       | Karnataka        | 6620.00    | 696.00      | 652.61      | 351.13      | 650.11        | 73.50       | 450.00    | 165.78      | 151.00          | 1.00        | 852372    | 1287.4      |
| 13       | Kerala           | 87500      | 200         | 466.85      | 84.62       | 63963         |             |           |             | 37.00           |             | 2018.48   | 8662        |
| 14       | Madhya Pradesh   | 5500.00    | 50.90       | 336.32      | 41.16       | 141979        | 1.00        |           |             | 92.00           | 2.70        | 7348.11   | 9576        |
| 15       | Maharashtra      | 3650.00    | 124280      | 59947       | 207.08      | 1031.33       | 11.50       | 1250.00   | 50.50       | 287.00          | 1.00        | 6817.80   | 1512.8      |
| 16       | Manipur          |            |             | 105.63      | 5.45        |               |             |           |             | 2.00            |             | 107.63    | 5.45        |

| 1  | 2                    | 3        | 4       | 5      | 6       | 7       | 8      | 9       | 10     | 11      | 12    | 13       | 14     |
|----|----------------------|----------|---------|--------|---------|---------|--------|---------|--------|---------|-------|----------|--------|
| 17 | Meghalaya            |          |         | 181.50 | 30.71   | 11.08   |        |         |        | 200.1   |       | 194.58   | 3071   |
| 18 | Mizoram              |          |         | 190.32 | 1476    |         |        |         |        | 50      |       | 191.82   | 14.76  |
| 19 | Nagaland             |          |         | 181.39 | 20.67   |         |        |         |        |         |       | 181.39   | 2067   |
| 20 | Orissa               | 1700.00  |         | 156.76 | 730     | 13577   |        |         |        | 22.00   |       | 2014.53  | 7.30   |
| 21 | Punjab               |          |         | 65.26  | 12255   | 322305  | 16.00  | 300.00  | 12.00  | 4500    | 1.00  | 363331   | 151.55 |
| 22 | Rajasthan            | 5400.00  | 385.80  | 27.26  | 23.85   | 1293.60 | 23.30  |         |        | 62.00   |       | 6782.86  | 432.95 |
| 23 | Sikkim               |          |         | 20275  | 38.60   |         |        |         |        |         |       | 20275    | 38.60  |
| 24 | Tamil Nadu           | 3050.00  | 3175.50 | 338.92 | 77.70   | 1376.11 | 81.50  | 450.00  | 134.00 | 151.00  | 1.75  | 5366.03  | 34704  |
| 25 | Tripura              |          |         | 985    | 1601    |         |        |         |        | 1.50    |       | 11.35    | 1601   |
| 26 | Uttar Pradesh        |          |         | 267.06 | 25.10   | 2855.25 |        | 1250.00 | 121.50 | 176.00  | 5.00  | 4548.31  | 151.60 |
| 27 | Uttaranchal          |          |         | 147824 | 7545    | 58.71   |        |         |        | 4.50    |       | 1541.45  | 75.45  |
| 28 | West Bengal          | 450.00   | 1.10    | 182.02 | 9840    | 547.91  |        |         |        | 147.00  |       | 1326.93  | 99.50  |
| 29 | Andman & Nicobar     |          |         | 6.40   | 5.25    |         |        |         |        |         |       | 6.40     | 5.25   |
| 30 | Chandigarh           |          |         |        |         |         |        |         |        | 6.00    |       | 6.00     |        |
| 31 | Dadra & Nagar Haveli |          |         |        |         |         |        |         |        |         |       |          |        |
| 32 | Daman & Diu          |          |         |        |         |         |        |         |        |         |       |          |        |
| 33 | Delhi                |          |         |        |         |         |        |         |        | 131.00  |       | 131.00   |        |
| 34 | Lakshadweep          |          |         |        |         |         |        |         |        |         |       |          |        |
| 35 | Pondicherry          |          |         |        |         |         |        |         |        | 250     |       | 2.50     |        |
| 36 | Others               | 3.20     |         |        |         |         |        |         |        |         |       | 1020.00  |        |
|    | TOTAL:               | 45195.00 | 6070.30 | 10476  | 1849.78 |         | 466.50 | 5000.00 | 571.83 | 2700.00 | 34.95 | 84777.38 | 8993.3 |

\*Industrial waste to energy potential spread over different States/UTs

## Foot Notes:—

- (1) Potential based on areas having wind power density (wpd) greater than  $200 \text{ W/m}^2$  assuming land availability in potential areas @ 1 per cent and requirement of wind farms @  $12 \text{ ha/MW}$ , not all of which may be technically feasible for grid-interactive wind power. In line with international practice for setting up grid-interactive wind power systems, potential would drop substantially if sites having wpd greater than  $300 \text{ W/m}^2$  were to be considered. However, the lower end of the potential might be suitable for off-grid applications. Further, preliminary surveys do not at this juncture suggest a sizeable grid-interactive off-shore wind power potential.
- (2) Technically feasible potential only of identified sites, not all of which may be economically viable. Technically feasible hydro potential of all sites upto 25MW station capacity has, however, been placed at 15,000 MWe.
- (3) Although the potential is based on surplus agro-residues, in practice biomass power generation units prefer to use fuel-wood for techno-economic reasons. A potential of 45,000 MWe from around 20mha of wastelands assumed to be yielding 10MT/ha/annum of woody biomass having 4000 k-cal/kg with system efficiency of 30% and 75% PLF has not been taken into account. In order to realize this potential a major inter-Ministerial initiative involving, among others, Environment & Forests, Agriculture, Rural Development and Panchayati Raj would be required. Further, Biomass a Atlas is under preparation which is expected to more accurately assess State-wise renewable energy potential from agro-residues.
- (4) With new sugar mills and modernization of existing ones, technically feasible potential is assessed at 5000 MWe, not all of which may be economically viable. Furthermore, several sugar companies/cooperatives are unable to develop bankable projects on account of their financial and liquidity positions.
- (5) With expansion of urban population post census 2001, current technically feasible potential assessed at 2700 MWe, not all of which may be economically viable. However, subsidy

disbursement under the programme has been kept in abeyance on the orders of the Supreme Court until final disposal of a PIL seeking composting as the preferred route for MSW disposal.

- (6) However, renewable energy potential has been placed at 84,777 MWe, not all of which may be suitable for grid-interactive power for technical and/or economic reasons. In the estimate, full technically feasible potential of 15,000 MWe for Small Hydro Power has been taken into account. Further, estimate excludes potential for solar power which is dependent on future developments that might make solar technology cost-competitive for grid-interactive power generation applications.

#### **Grants for generation of solar and wind energy**

1257. SHRI C. RAMACHANDRAIAH: Will the Minister of NEW AND RENEWABLE ENERGY be pleased to state:

(a) the details of the institutions/NGOs which were provided funds as grants by Government for the generation of solar and wind energy in the country during each of the last three years, State-wise particularly Andhra Pradesh;

(b) the total grants provided to each of them during the above period;

(c) whether Government are aware that grants provided have not been fully utilized by them during the period, causing shortfall in generation of solar and wind energy;

(d) if so, the details thereof; and

(e) the action taken by Government against such institutions/NGOs?

THE MINISTER OF STATE OF THE MINISTRY OF NEW AND RENEWABLE ENERGY (SHRI VILAS MUTTEMWAR): (a) and (b) State-wise details of the central financial assistance provided to institutions/NGOs for supporting solar energy programmes during last three years *i.e.*, 2003-04 to 2005-06 are given in Statement (see below).

(c) and (d) The institutions/NGOs are required to periodically submit progress reports, utilization certificates and audited statements of expenditure in support of utilization of funds released to them.

(e) Does not arise.